

Origin, Age, and Geochemical Evolution of Dixie Valley Geothermal Fluid

Cathy Janik
U. S. Geological Survey
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REGIONAL FLUID GEOCHEMISTRY

Principal Investigators

Greg Nimz LLNL

Fraser Goff LANL

Cathy Janik USGS

Research Supported by the
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Collaborators

- Charles Dunlap, UC Santa Cruz
- Oxbow Power Services, Inc.

Stuart Johnson

Dick Benoit

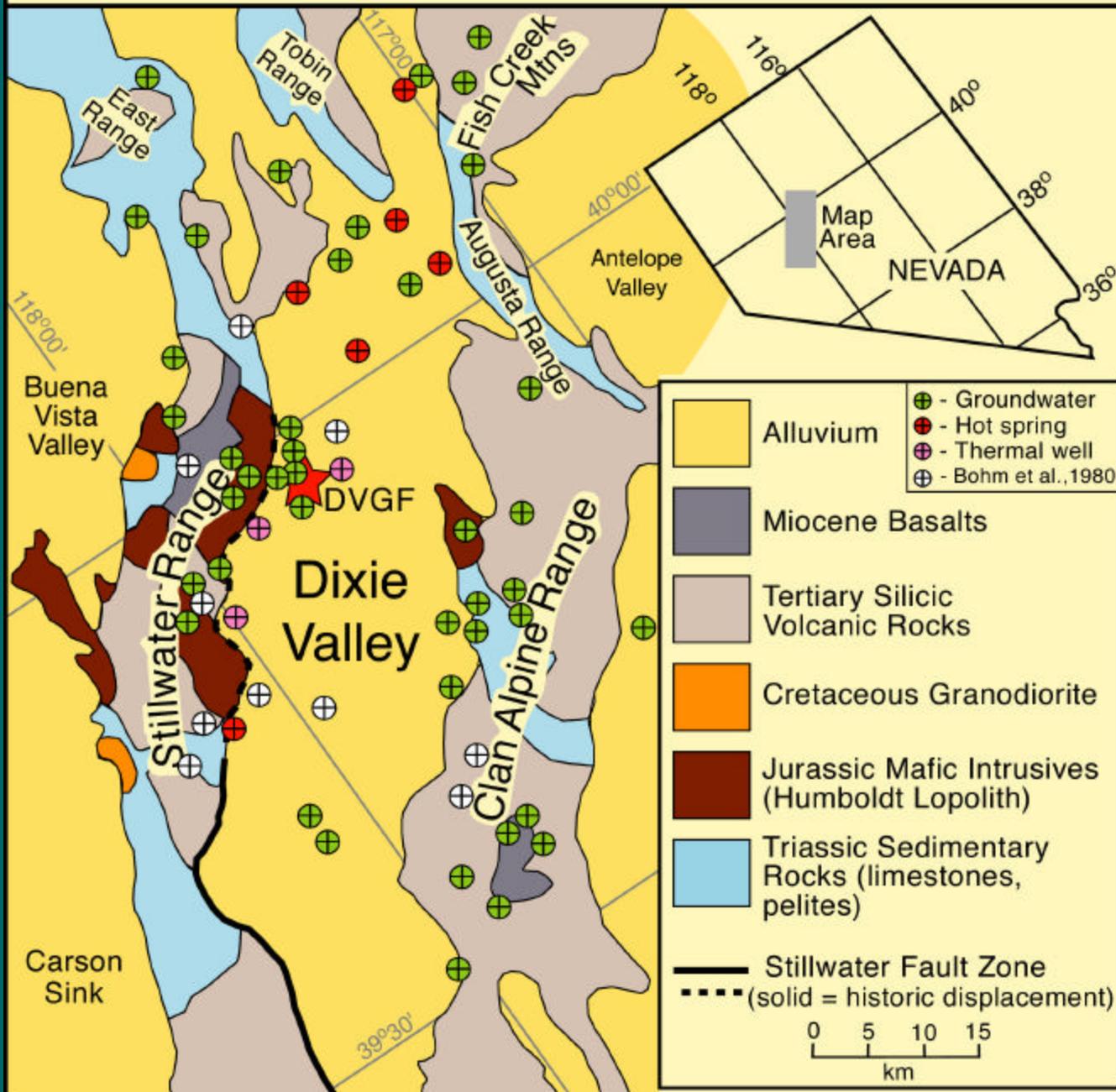
Analysts

- Dale Counce LANL Water and gas chemistry
- Mark Huebner USGS C-isotope preps
- T. Coplen Lab USGS δD and $\delta^{18}\text{O}$
- Doug White USGS ^{13}C mass spectrometry
- Cathy Janik USGS Gas chemistry

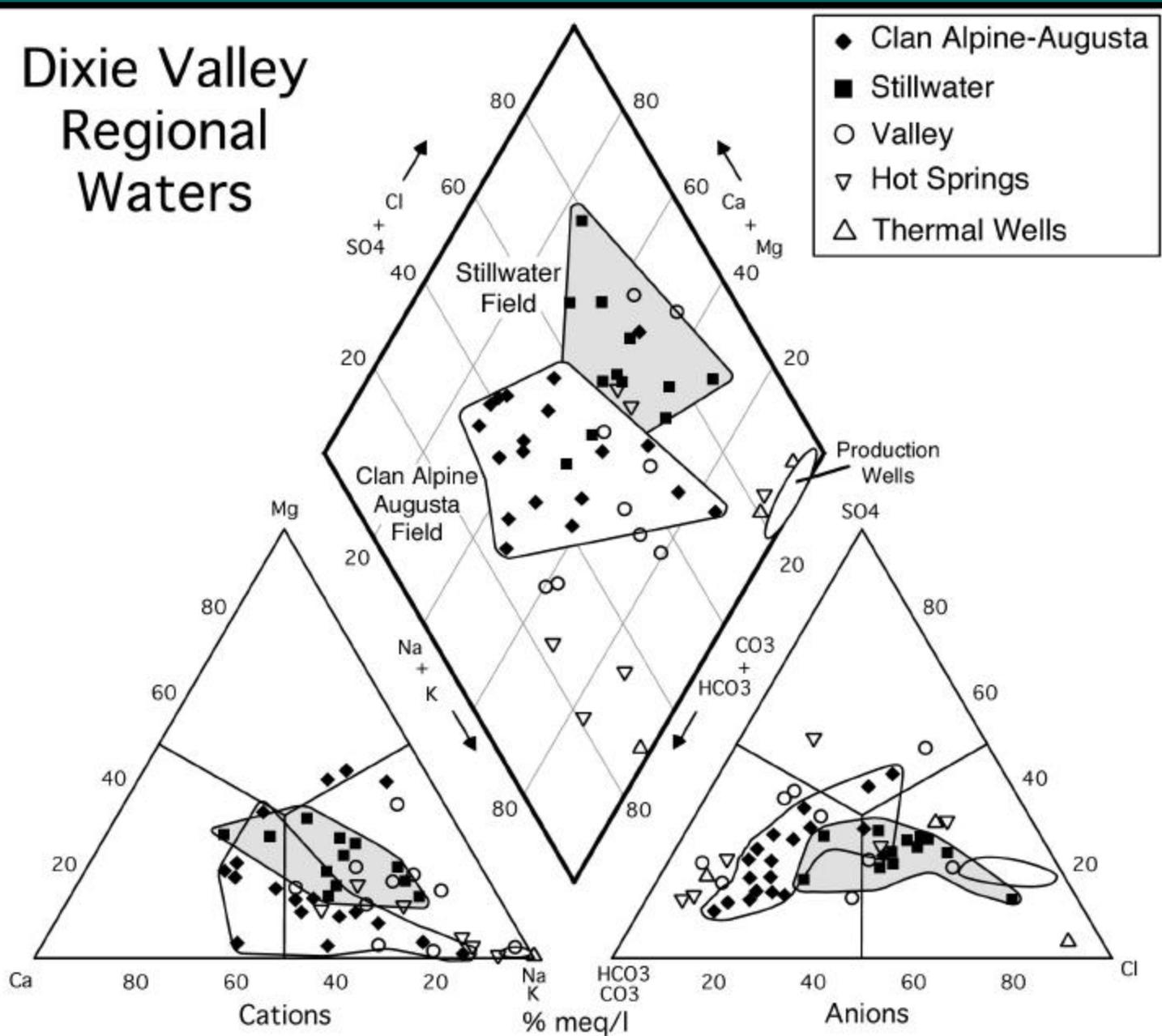
Objectives

- Characterize relations between
 - Regional ground waters
 - Valley hot springs
 - Geothermal production fluids
- Using: Fluid chemistry
 - δD and $\delta^{18}\text{O}$
 - ^{14}C and $\delta^{13}\text{C}$
 - $^{87}\text{Sr}/^{86}\text{Sr}$, and $^{36}\text{Cl}/\text{Cl}$

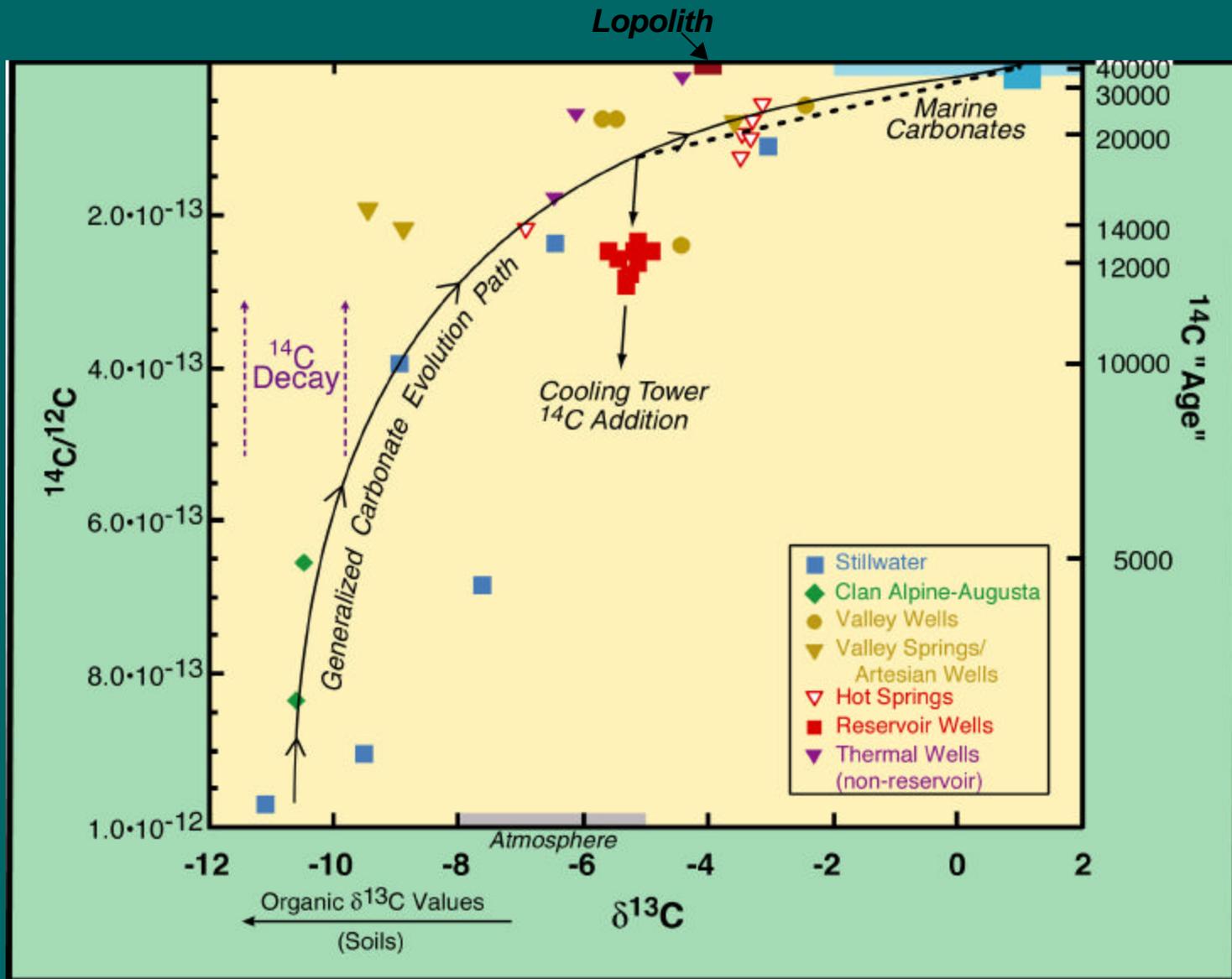
Location of the Dixie Valley Geothermal Field



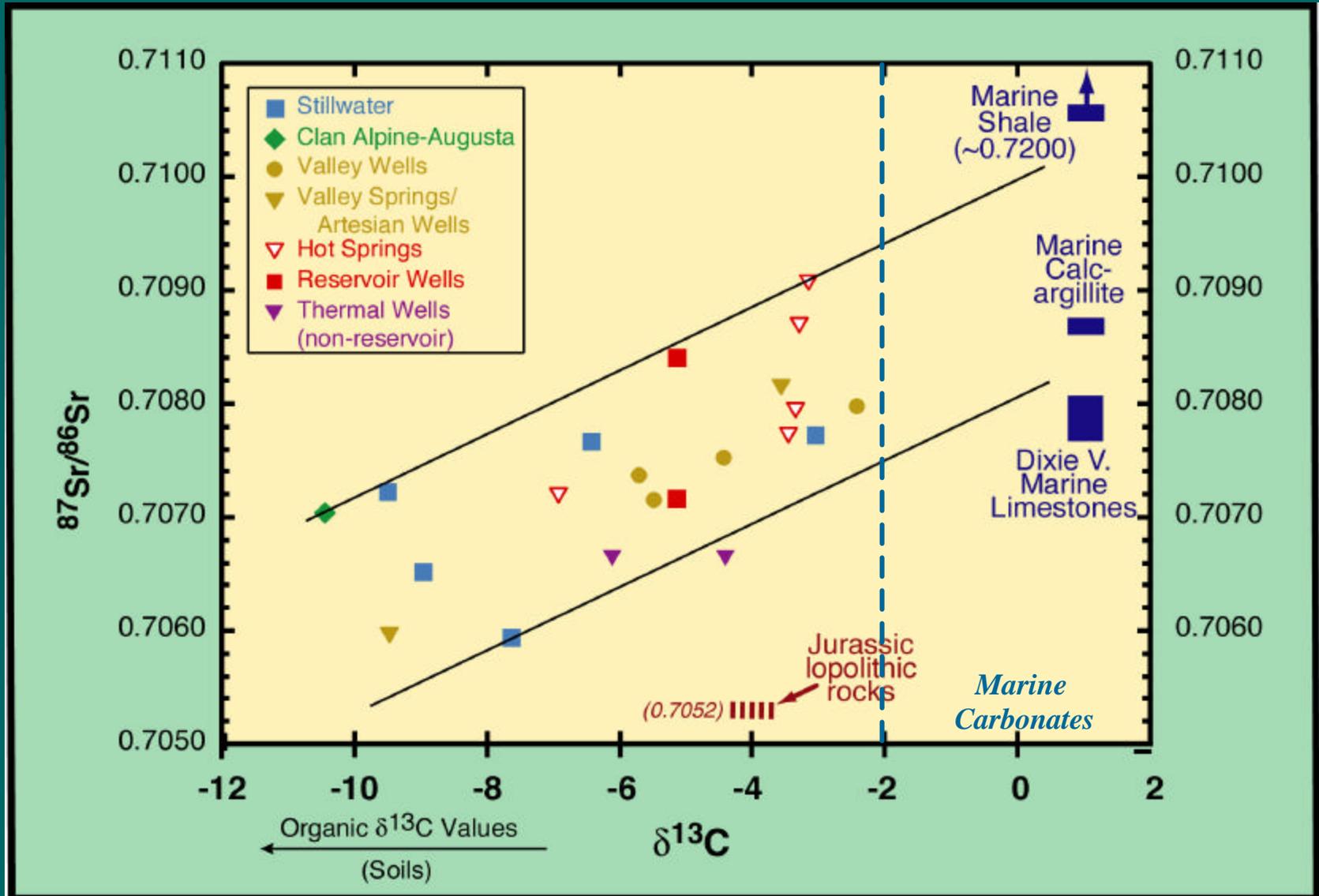
Dixie Valley Regional Waters

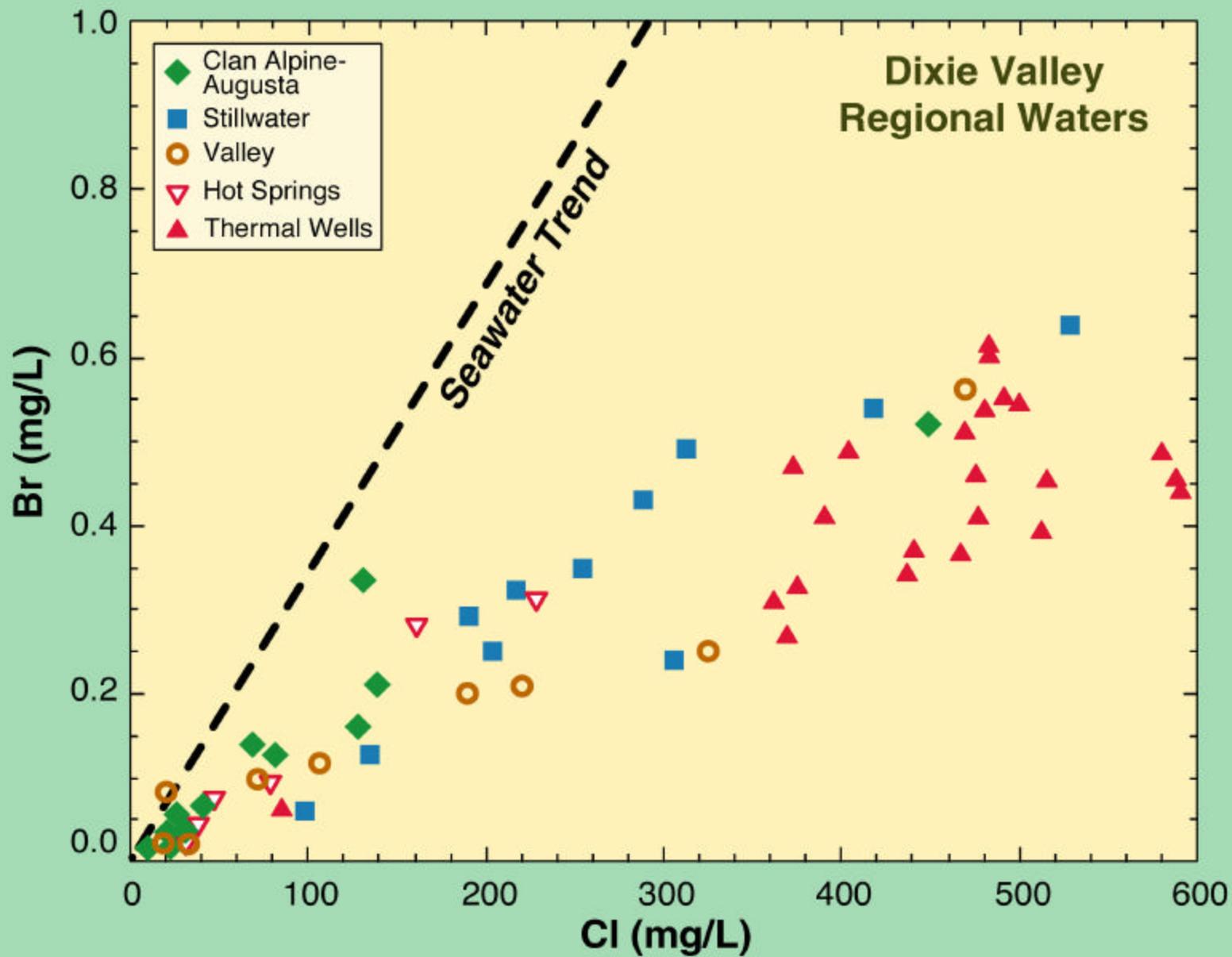


Generalized Carbon Evolution Path

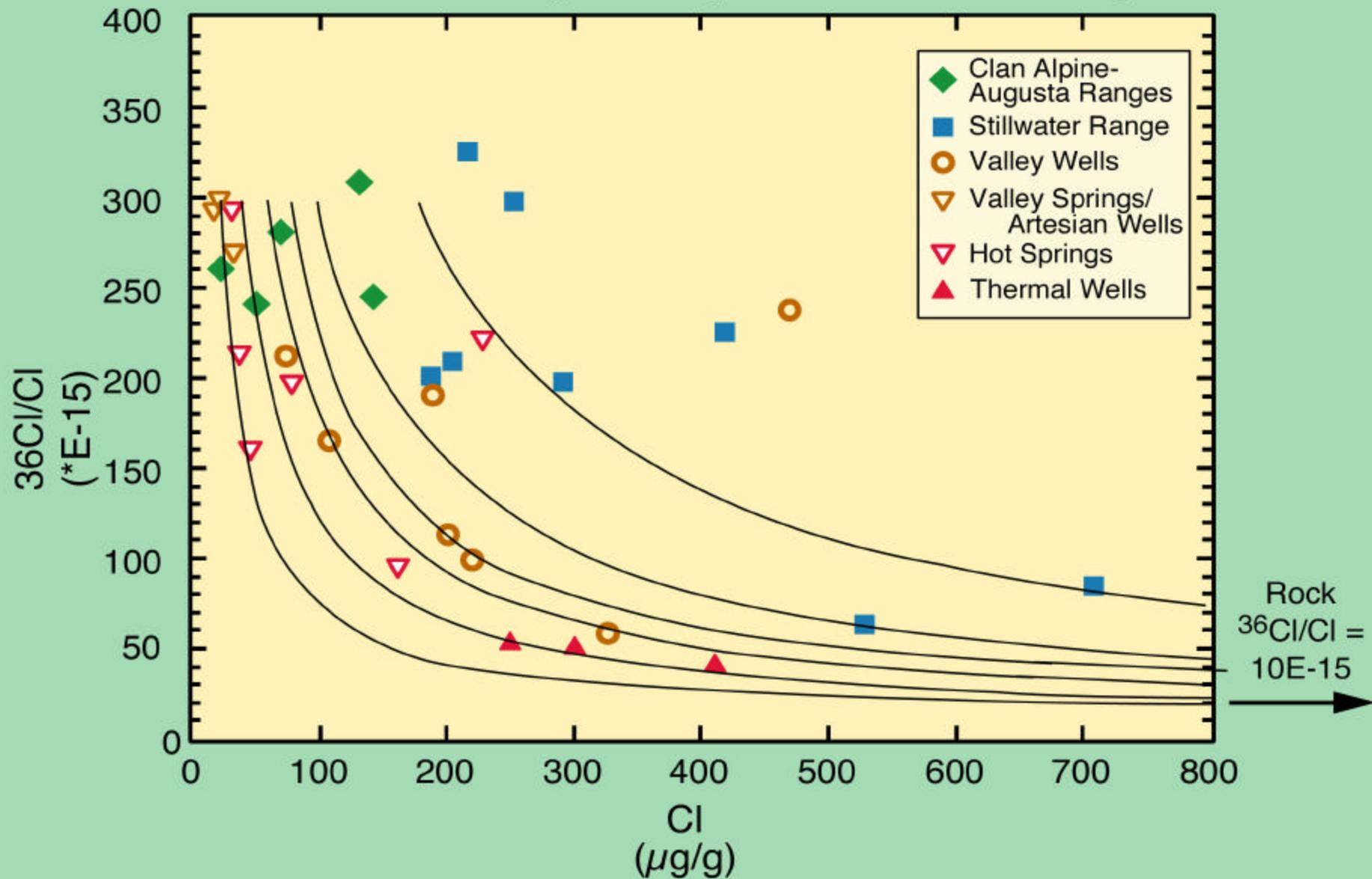


Interaction of marine rocks and regional waters

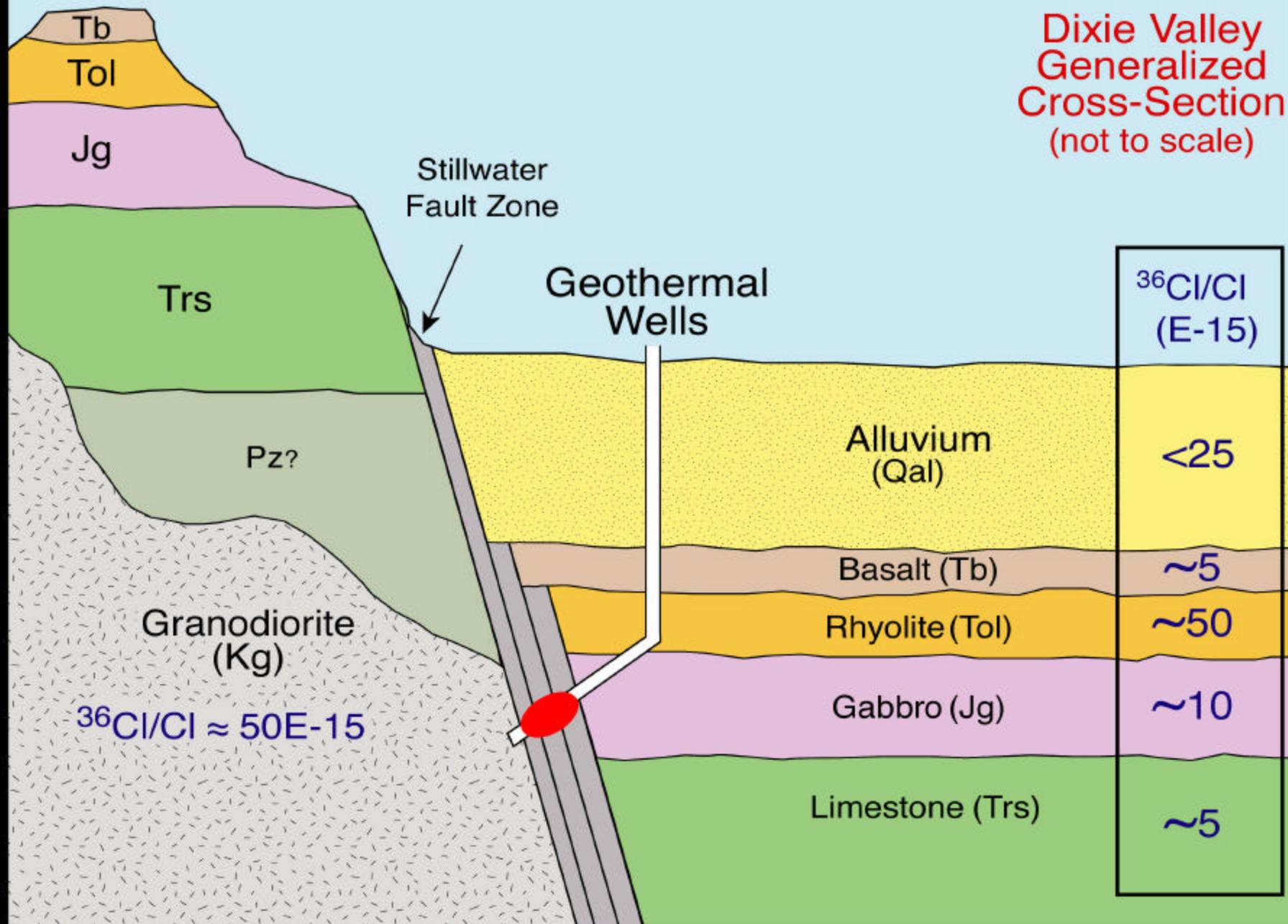




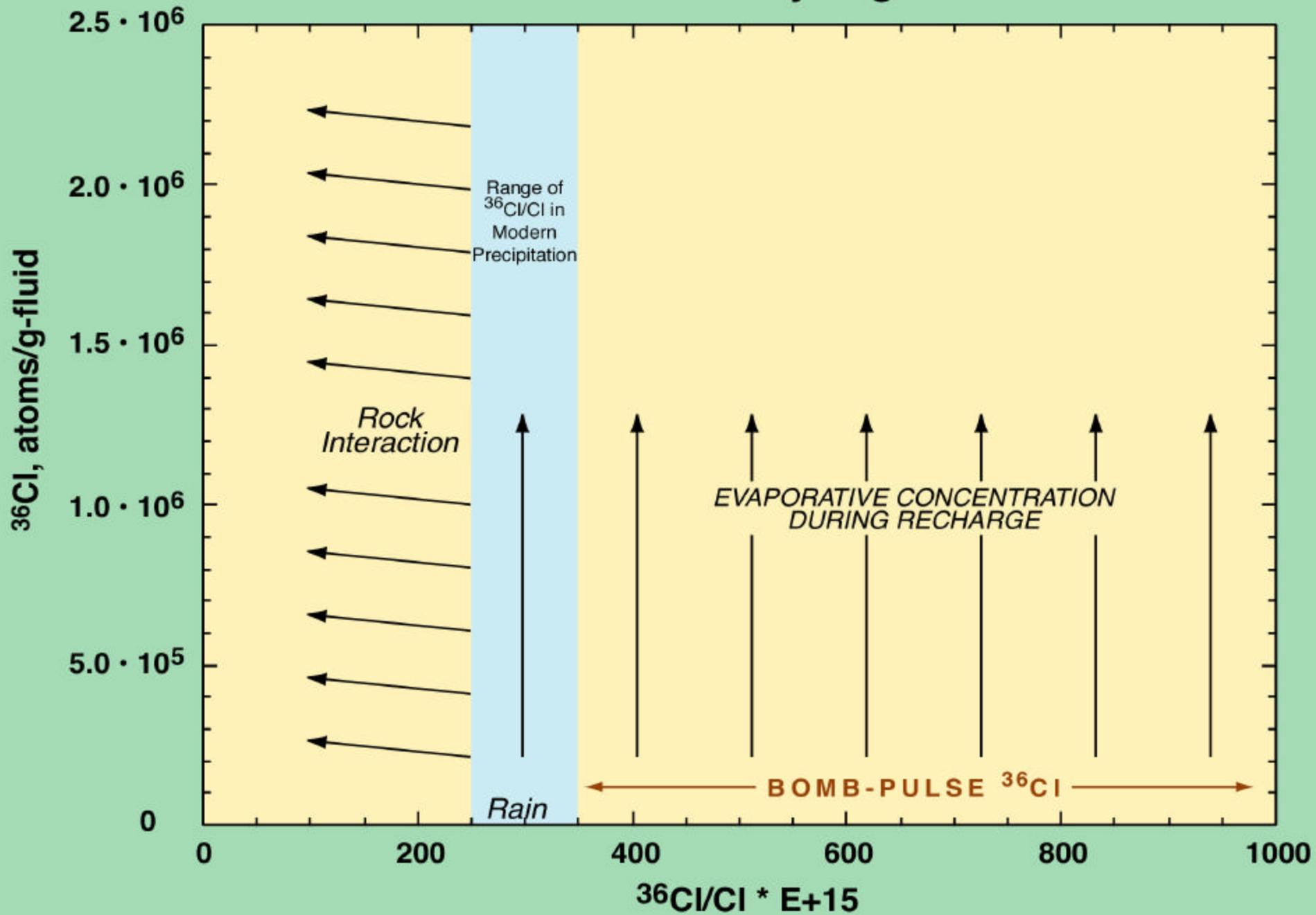
Chloride Dissolving from Lopolith or Marine Lithologies



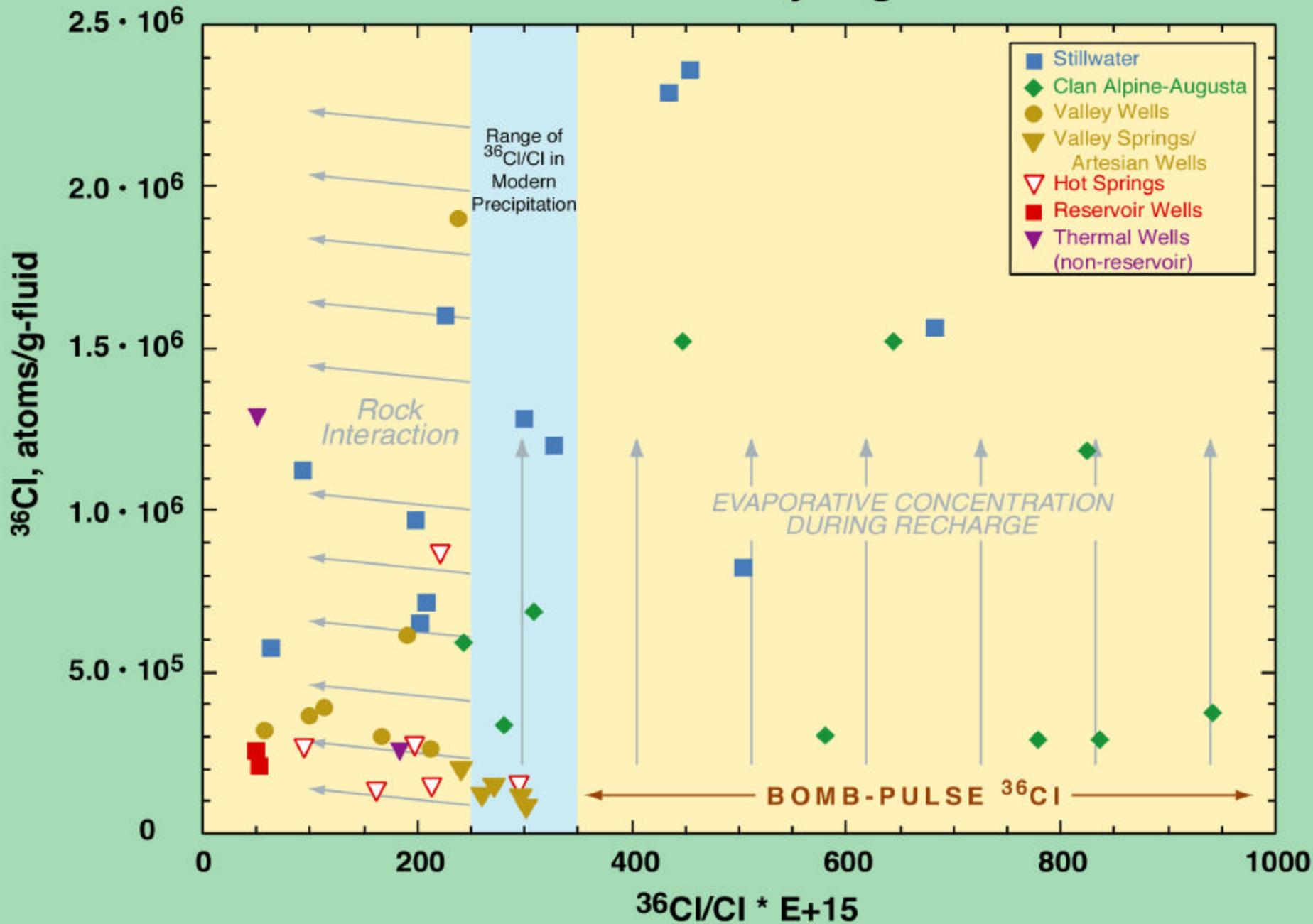
Dixie Valley
Generalized
Cross-Section
(not to scale)



Chlorine-36 in Dixie Valley Regional Waters



Chlorine-36 in Dixie Valley Regional Waters



Conclusions

- DV Reservoir Fluid evolved from Valley Waters.
- Water-rock interaction with marine carbonates, NOT with the lopolith.
- These waters are Pleistocene in age, 12,000–20,000 years old.
- Recharge to the reservoir was NOT from the mountain ranges.

THE BOTTOM LINE

The origin of the Dixie Valley geothermal reservoir fluid was vertical recharge of water from “Lake Dixie” in the Pleistocene. To reach 250°C, the water circulated to 5–6 km depth.

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